

## ABSTRACT OF THE DISCLOSURE

A communication transmission emulator digitally emulates a plurality of signal impairments created by the transmission components and communication medium in a typical communication system. A variety of linear and non-linear distortion characteristics are impressed on a baseband  
5 signal between transmit and receive modems to effect thorough testing and optimization of modem performance without requiring transmission frequency components and/or the communication channel. The communication transmission emulator comprises transmission channel transmit modules, receive modules and communication media modules. Transmit and receive modules accepting or outputting analogue or digital signals. The transmission emulator is configurable to allow a simulation of a single channel communication; a simulation of a full duplex communication; a simulation of a common base station receiver with multiple users transmitting and a simulation of a base station transmitter with multiple users receiving, all configurations with or without the communication media emulator module. The communication media modules simulate multipath signal components and distortions for the chosen medium. In dependence upon the configuration, each module type and number can be individually configured, adding a plurality of linear and non-linear impairments to the baseband signal along with delay components to evaluate and optimize modem design and technology.